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## A CO-OPERATIVE COURSE IN ENGLISH COMPOSITION FOR STUDENTS IN TECHNICAL COURSES

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EDWARD A. DUDDY  
Montana State College, Bozeman, Montana

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The idea of the co-operative course is not new. (See *Bureau of Education Bulletin*, 1916, No. 37, which contains a bibliography. For a more recent discussion, Bulletin No. 11 of the Carnegie Institution on *Engineering Education*.) Concerning the co-operative course in English for engineering students, much interesting information will be found in the May, 1915, *Bulletin of the Society for Promotion of Engineering Education*. The only excuse for writing this article is the belief that a type of course which is still in the experimental stage will best be perfected by a comparison of the results obtained under varying conditions. The course which I am to describe was given in the winter of 1919 to a class of advanced students, mostly Seniors, all taking technical courses.

Before proceeding to a description of the course, let me make clear my preference for such a course only when preceded by a careful review and enforcement of elementary principles such as college students ordinarily get in the Freshman year. Not only that; such a course should assume a previous course either in composition or in literature which shall have a broadening effect on the student's outlook before he plunges into the intense specialization of his last two years of college study. An attempt to supply such a groundwork for the advanced technical course in writing has been made in the work prescribed for the Freshman and Sophomore years at the Montana State College.

Three essential ideas were kept in mind in working out the course: (1) to relate the work done in English to the work done in the student's technical courses; (2) to secure close co-operation between the English department and the technical departments in planning the course, and in the business of criticism and correction

of the work done; (3) to make the work effective for the student by supplying, whenever possible, an actual audience for him to address.

In a comparatively small class, chemistry, botany, mechanical engineering, and home-science subjects were represented. The class met once a week, and individual conferences of thirty minutes in length were held once a week with the instructor. One oral or written exercise each week was required. Outlines were prepared adapted to the vocational specialty of the student. The first half of the course especially emphasized oral work; the second half dealt exclusively with written exercises. Typical of the subjects assigned to the chemistry students for the first half of the course are the following: The first was written and oral abstract of an article in a chemical journal. For the second exercise, the local chamber of commerce submitted a query from an eastern capitalist who wanted to know if the condition of the local water supply was favorable for the establishment of a laundry in the town. The students were required to apply their knowledge of water analysis in writing a letter of reply; the problem also involved economic considerations. The letters were read by the students and criticized by members of the class at the weekly meeting. Letters of application for employment and letters of recommendation were also written. The preparation of a talk for a Housekeepers' Club on "Food Adulterants and How to Detect Them" was the theme for another exercise, which involved the student's knowledge of food analysis. The giving of oral evidence in a "near beer" case was staged as a mock trial, the students appearing as witnesses on both sides. The judge and attorneys were recruited from the staff of the chemistry department and the state experiment station. This exercise tested the knowledge of the students about ferments, an important part of their instruction in chemistry, and gave them valuable notions of professional ethics.

The final exercise in oral work was the preparation of a talk for high-school students on the subject, "Chemistry as a Vocation." One can hardly justify this as a strictly technical subject, but it proved an admirable one for centering all the suggestions the student had received about effective oral presentation of material;

it had the effect of simplifying technical vocabulary; and it put to test the student's knowledge of his vocation in a most comprehensive way. The talks ranged in length from twenty to forty-five minutes and were actually delivered before audiences of high-school students in the neighboring towns.

In connection with this last exercise it might be interesting to note that one of the students in preparing her paper on "Botany as a Vocation" made a canvass of members of the college faculty and of high-school principals to find out the personal and educational qualifications which were considered necessary or desirable in a worker in the field of pure science either in laboratory or research work, or in teaching. This is typical of the many ways in which the idea of scientific method may be inculcated in the handling of the co-operative course.

Programs similar to the above were made out for the botany and home-science students. Three subjects were common to all the programs: writing the abstract of a printed article, writing letters of application and of recommendation, and preparing the talk on choice of vocation. Some of the remaining exercises for the botany students are indicated by the following subjects: A farmer has written to the state experiment station that seed wheat which he has treated with formaldehyde to prevent smut will not germinate. The student is required to answer the letter, giving the proper information. A report of a field investigation of different kinds of weeds found on vacant city lots was written. A talk for a farm-bureau meeting was prepared on the subject of plant diseases and their control. In an exercise similar to that of the chemistry students, oral testimony was prepared and delivered in a suit for damages brought under the state seed law for the sale of impure seed. The case was conducted by members of the class and the testimony called for very precise technical knowledge on the part of the students, with the use of diagrams drawn on the board.

A high degree of co-operation was secured with the home-science department. In addition to the exercises in common with the other students, the home-science group prepared talks to be delivered before home-science Freshmen sections on the work of the home-demonstration agent. Letters answering queries of

housewives on such subjects as the proper use of white-flour substitutes, house decoration, etc., were written. A report of field work necessary to be done by a home-demonstration agent was prepared. A demonstration on the use of the fireless cooker for a farmers'-picnic audience was given before the class in home science.

In the second half of the course the emphasis was shifted to written work. The first class meetings were taken up with talks on the requisites of written work designed for publication. The daily paper was first considered and copies of the local daily and other state papers were brought into class and analyzed. Short articles adapted for the general reader were then prepared by the home-science group on such subjects as "Balanced Menus," "Care and Preparation of Milk for Artificial Feeding of Infants," "Preparation of Food for Invalids," etc. The botany group wrote an article on "The Inoculation of Alfalfa Seed" for a country weekly. A spring clean-up campaign was on in the city, and this group, which was also taking courses in bacteriology, attempted an alley survey which was written up to give added impetus to the clean-up movement. The chemistry group wrote on "Food Law Regulation of Food Sweeteners," and reported on the condition of the city sewage disposal plant which had been the source of some complaints. A mechanical-engineering student who had joined the class in the second half of the course contributed one of the most valuable articles, a proposal for a refrigerating plant for the city with details as to economic value and cost of installation. His second article was based upon a survey of the heating and ventilating system of a new junior high school in the city with a view to describing a thoroughly modern system. Practically all of these articles were published in the local city papers or in daily or weekly papers about the state.

The weekly and bi-monthly farm papers next claimed our attention, and to these papers the chemistry students contributed a series of articles on the new state gasoline-standards law. Another series by the same group was written on "The Sanitary Protection of Farm Water Supplies Used for Human Consumption." The home-science group contributed papers on "The Value of Milk

and Butter in the Diet," "Beautifying the Rural Home and Grounds." The botany group did an excellent piece of work on the subject of "Native Grasses of Use to the Farmer." A second paper was written on "Apple Pollination." The mechanical engineer wrote on "Ignition Troubles" and a second paper, accompanied by a half-tone cut and a diagram, on "Installing a Hydraulic Ram for Use on the Farm."

The longer article for the technical magazine was next attempted. Free play was given here to technical vocabulary. Publication of these articles was not considered seriously, for the evident reason that little or no original investigation was involved in their preparation. Two papers written by the home-science group were submitted, however. One on the plan of the English course was sent to *The Candle*, a home-science publication; another on "The Work of the Home Demonstration Agent in Montana" was sent to the *Journal of Home Economics*. The botany group wrote a description of a botanical specimen using the white loco weed for a subject. This description was given purely technical treatment and then popularized. A second paper was prepared for a botany journal on "Stock Poisoning Plants Found in Montana." The mechanical engineer wrote on the gas producer, and for a second paper submitted his thesis, a design for a gas engine. The chemistry group, after a three days' inspection of a cement plant on the Missouri River, wrote on "The Selection of Raw Materials for Cement Making from a Geological and Chemical Standpoint." After another trip to the smelters of the Anaconda Copper Mining Company at Anaconda an article on "The Value of a By-product in Terms of Cost of Production and Marketability" was attempted.

Such was the program of the course. The omission of the report will be at once noticed, but all reports for the chemistry students had been reduced to forms by the chemistry department. The same was true of the home-science group, and of the engineering student so far as boiler test and pump test were concerned. The report of field work should, however, be given more attention. That the course is planned on perhaps too generous lines may be objected, but such a plan gave the needed variety to keep the

student "on the job" every minute. That much hard work was involved in instruction is not denied, but much of this might have been minimized if the class had been large enough to section according to vocation. However, the most helpful part of the instruction for the student came in the personal conference.

The advantages of the co-operative plan so far as it concerned the working together of the English and technical departments are not to be denied. Professors of chemistry and home science were very ready to acknowledge that the work in English was creating a higher degree of interest in the technical courses. This interest arose invariably from the acquiring of a new viewpoint of the part of the student toward his matter-of-fact technical information. His exercises in English compelled him to select out of the mass of his information just those facts which would fit a given case; to interpret them, to make them clear, both orally and in writing. He saw more clearly than ever before that this was the very task he would be called upon to perform after graduation—quite a different task from that of collecting and ordering the facts which he gathered from textbook, laboratory, and lecture. The development of this new power in the student to make a particular application of a general rule, is, in the writer's opinion, the most valuable by-product of the co-operative course in English.

So far as co-operation involves the relating of the work in English to the student's technical work and his actual experience, there, too, a distinct gain is made. Certainly there is interest in the work. Students who had written in an indifferent manner in their Freshman and Sophomore years now did excellent work. No complaint was made if the exercise demanded more time than the credit allotted to the course justified. Each piece of work was a task to be done in the best possible way in order to stand the test of actual presentation before an audience of listeners or readers. The fact that the results of the student's work were not simply to be passed upon by the instructor and then graded and pigeon-holed made an enormous difference in the care with which papers were prepared. As a matter of fact, individual papers were not graded, the grade being made up at the end of the quarter on the basis of the student's total performance.

In attempting oral presentation before an actual audience, the aim was not to turn out speech-makers but to give emphasis to some of the difficulties of adapting material to different types of audiences, and to discover some of the ways of holding the interest even with a technical or semi-technical subject. Nor was the aim to produce journalists in writing articles for actual publication. The principal gain here I have already mentioned: the additional care in preparation of material when the student knew that it was to become public property. Aside from some practical knowledge of how to get up a paper for publication, the next principal gain was the revelation to the student of the multiplicity of ways in which his technical information applied in the world of affairs. He had been trained exclusively in a laboratory; now he was going out into a greater laboratory of immensely greater possibilities if he could be made to see them. Especially was attention directed to the fact that even purely scientific and technical subjects might have an application to the social and non-technical side of life in such work as sanitation, food regulation, and rural betterment.